FIG.1

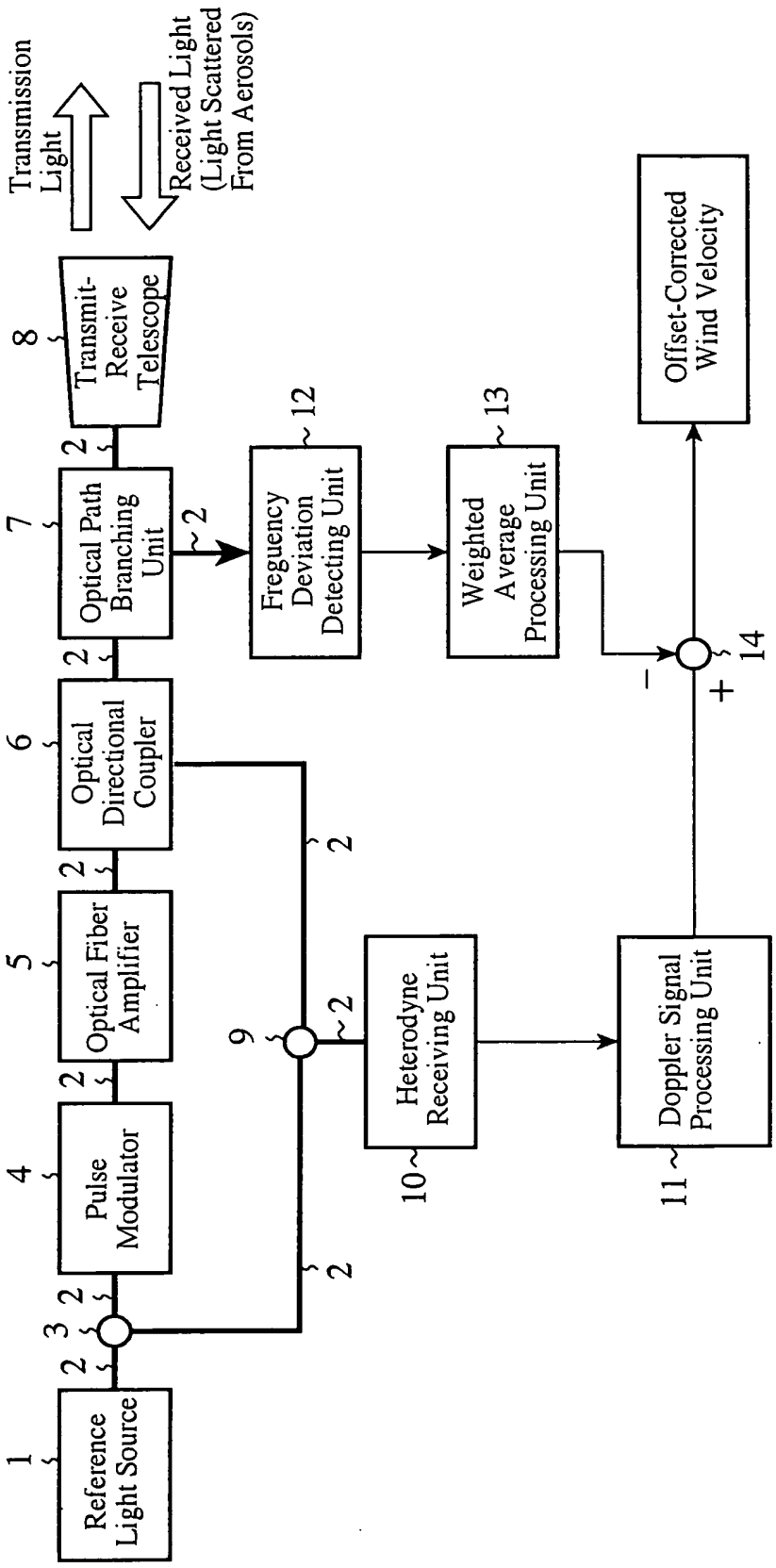

Transmission Light
Received Light (Light Scattered From Aerosols)
Transmit-Receive Telescope
Optical Path Branching Unit
Optical Directional Coupler
Optical Fiber Amplifier
Pulse Modulator
Reference Light Source
Freguency Deviation Detecting Unit
Weighted Average Processing Unit
Offset-Corrected Wind Velocity
Heterodyne Receiving Unit
Doppler Signal Processing Unit
1
2
3
4
5
6
7
8
9
10
11
12
13
14
2
−
+

FIG.2

Example of Velocity Offset ΔVoffset Which Is Calculated Based On Both Frequency Deviation fchirp of Pulsed Transmission Light of Wavelength $\lambda = 1.5\ \mu$m, And Equation (2)

Object Distance Resolution [m]	Transmission Light Pulse Width [μsec]	Transmission Light Frequency Deviation [MHz]	Offset Wind Velocity [m/s]
37.5	0.25	-1.01	0.76
75	0.5	-0.41	0.31
150	1.0	-0.20	0.15

FIG.3

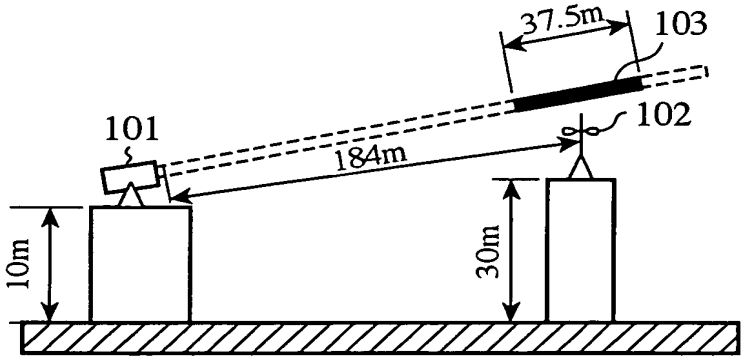
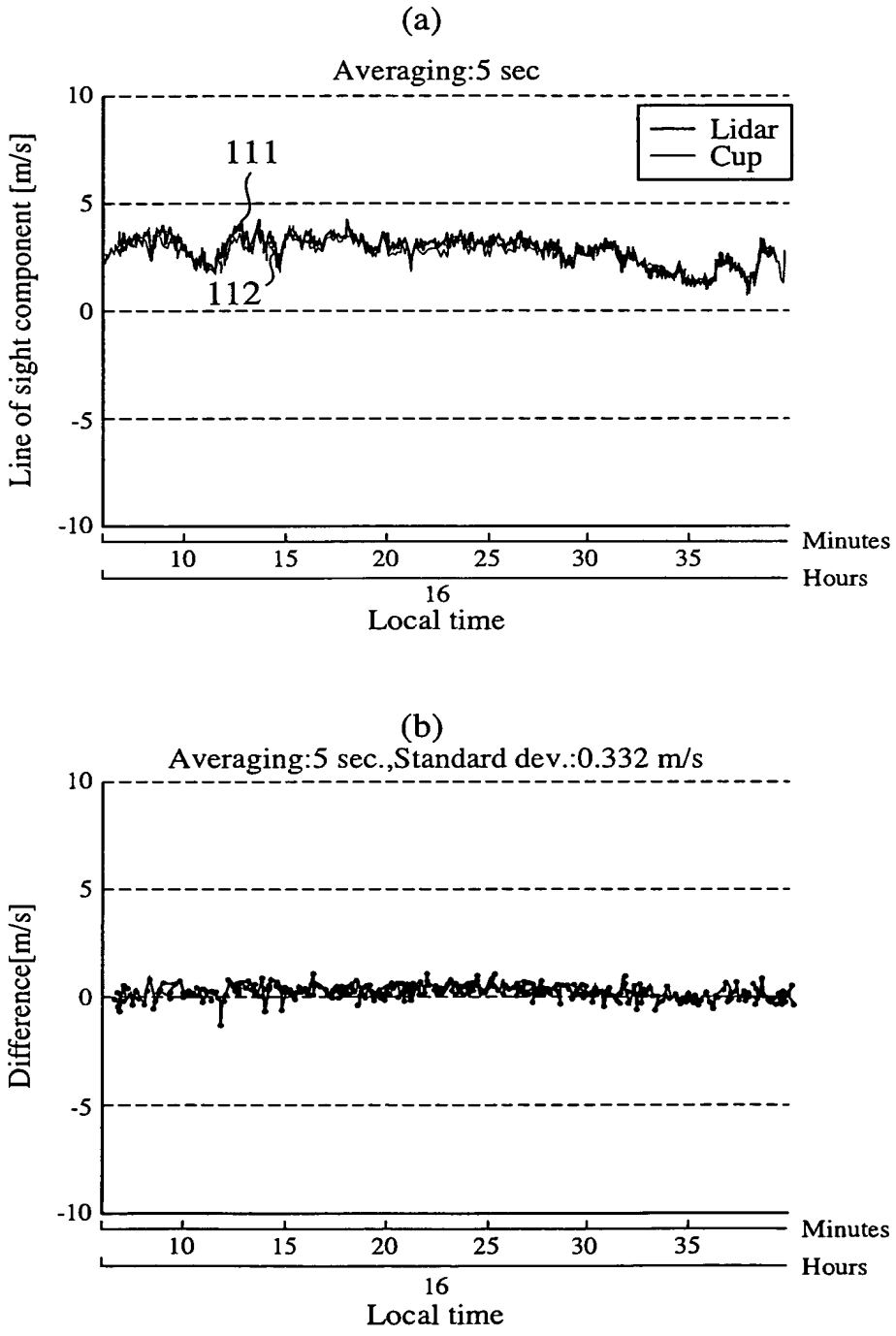


FIG.4



Result of Verification Experiment of Wind Velocity Offset Correction
(a) Time Series Data On Wind Velocities Measured By Both Measuring Instruments(398 5-Second Averaged Points)
(b)Difference Between Wind Velocities Measured By Both Measuring Instruments

FIG.5

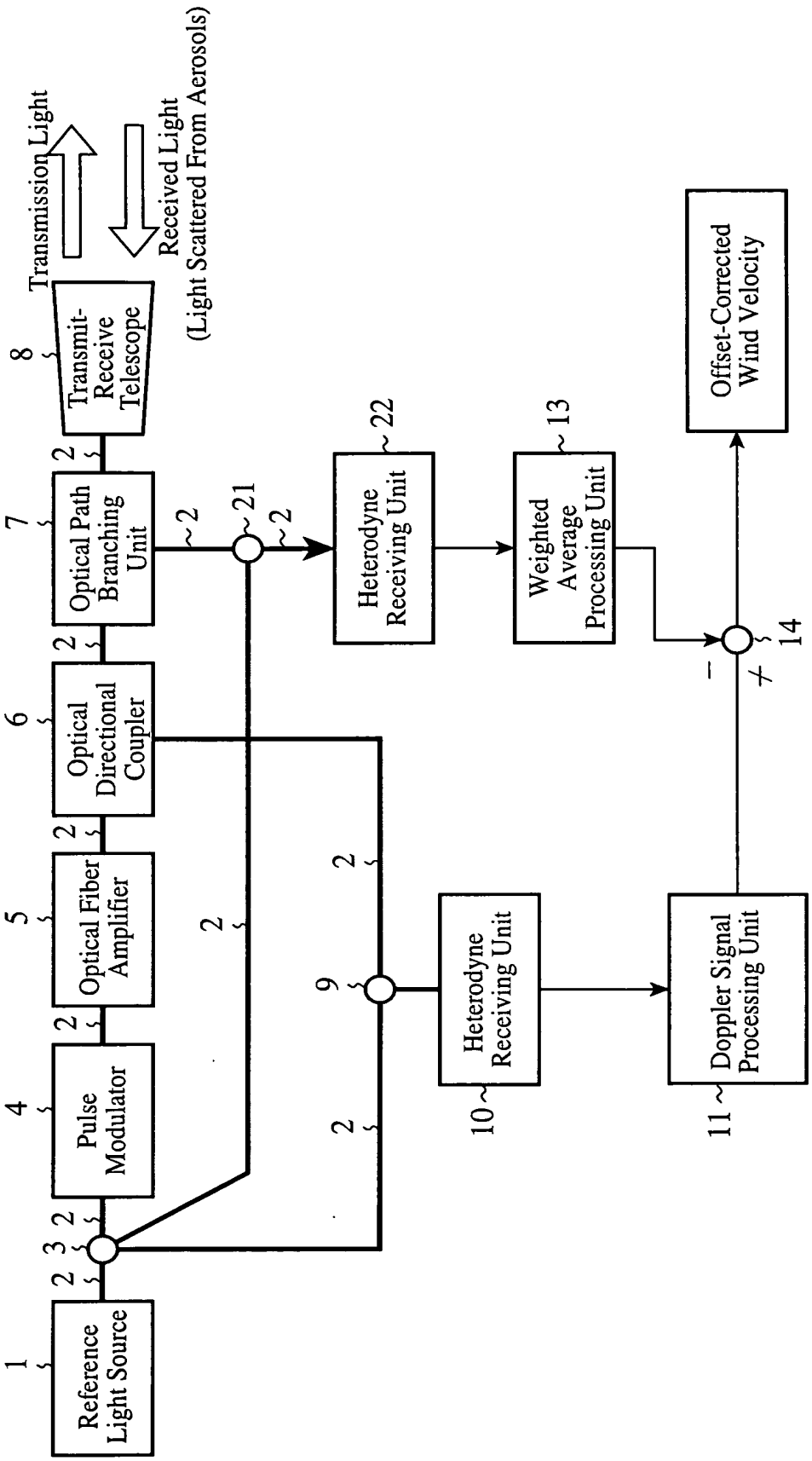

Reference Light Source
1
2
3
2
Pulse Modulator
4
2
Optical Fiber Amplifier
5
2
Optical Directional Coupler
6
2
Optical Path Branching Unit
7
2
Transmit-Receive Telescope
8
Transmission Light
Received Light
(Light Scattered From Aerosols)
2
21
2
Heterodyne Receiving Unit
22
Weighted Average Processing Unit
13
Offset-Corrected Wind Velocity
2
9
2
Heterodyne Receiving Unit
10
Doppler Signal Processing Unit
11
2
2
−
+
14

FIG.6

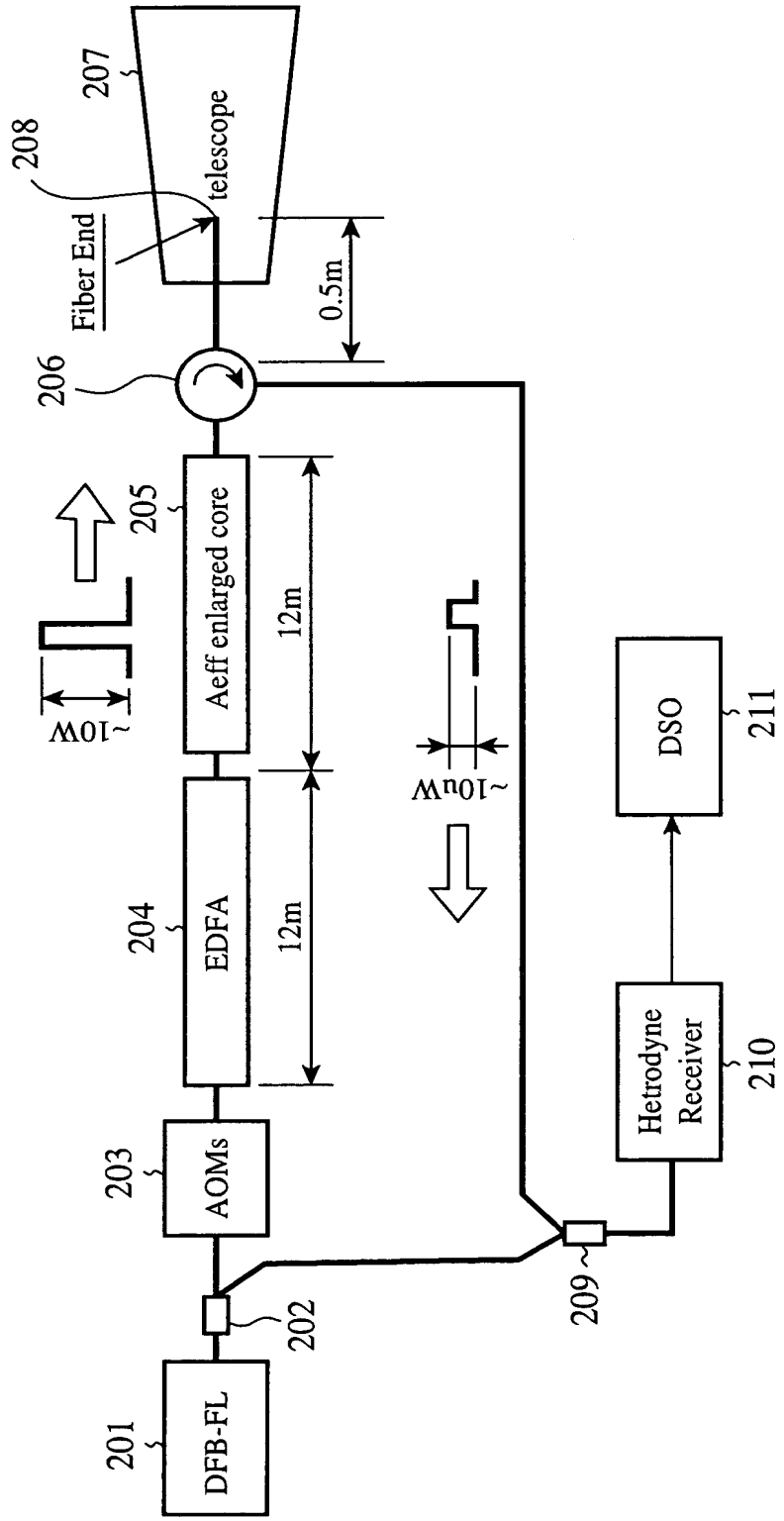
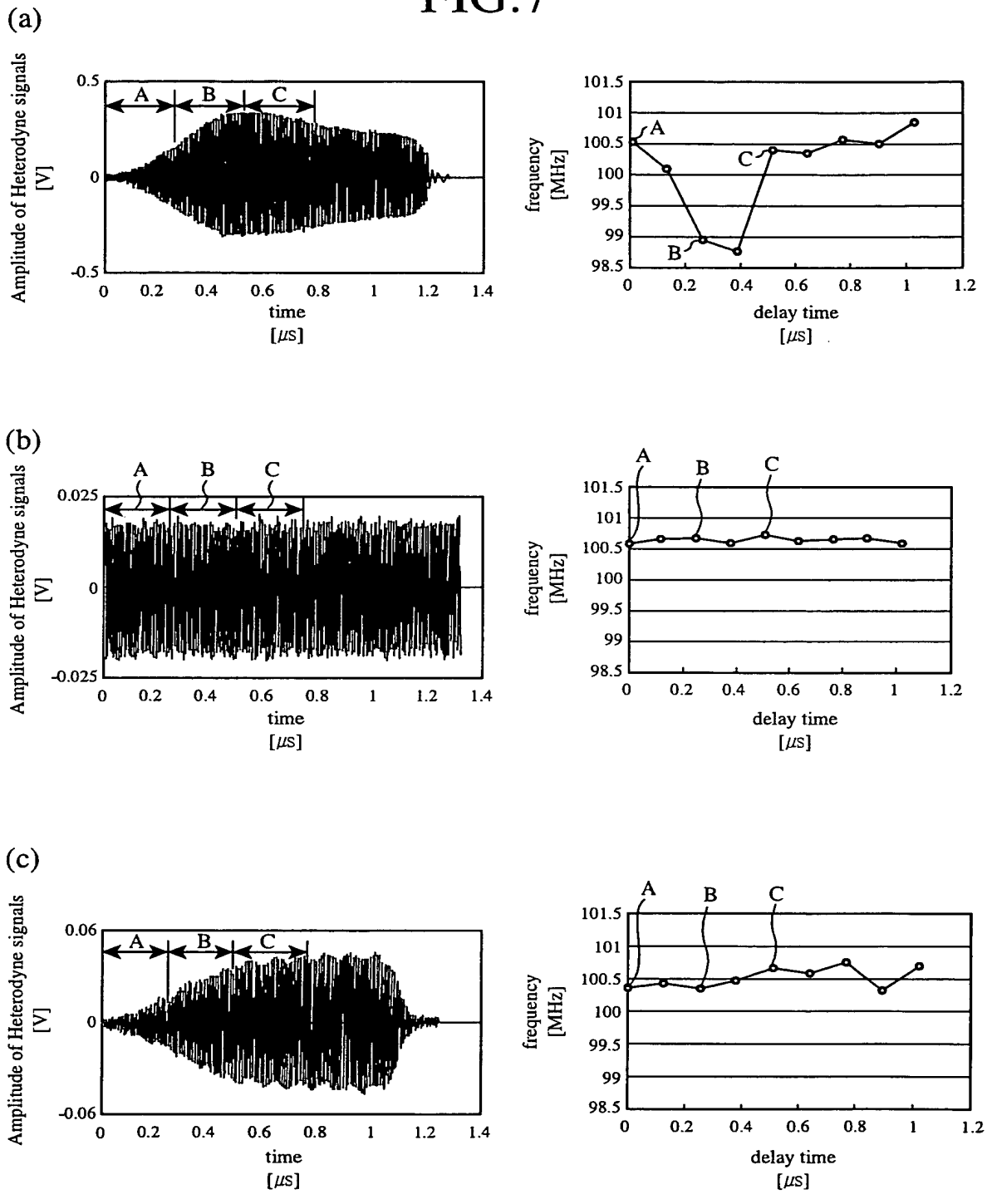

207
telescope
208
Fiber End
0.5m
206
205
Aeff enlarged core
12m
~10W
~10uW
204
EDFA
12m
203
AOMs
202
201
DFB-FL
209
Hetrodyne Receiver
210
DSO
211

FIG.7



Time Series Data (Shown On Left-Hand Side) On Heterodyne-Detected Signal of Internally-Reflected Light, And Frequency-Analysis Result (Shown On Right-Hand Side)
(a)When Pulsed Transmission Light Is Output Using EDFA
(b)When CW (Continuous Wave) Transmission Light Is Output
(c)When Pulsed Light Output From AOM Is Properly Attenuated And Heterodyne-Detected

FIG.8

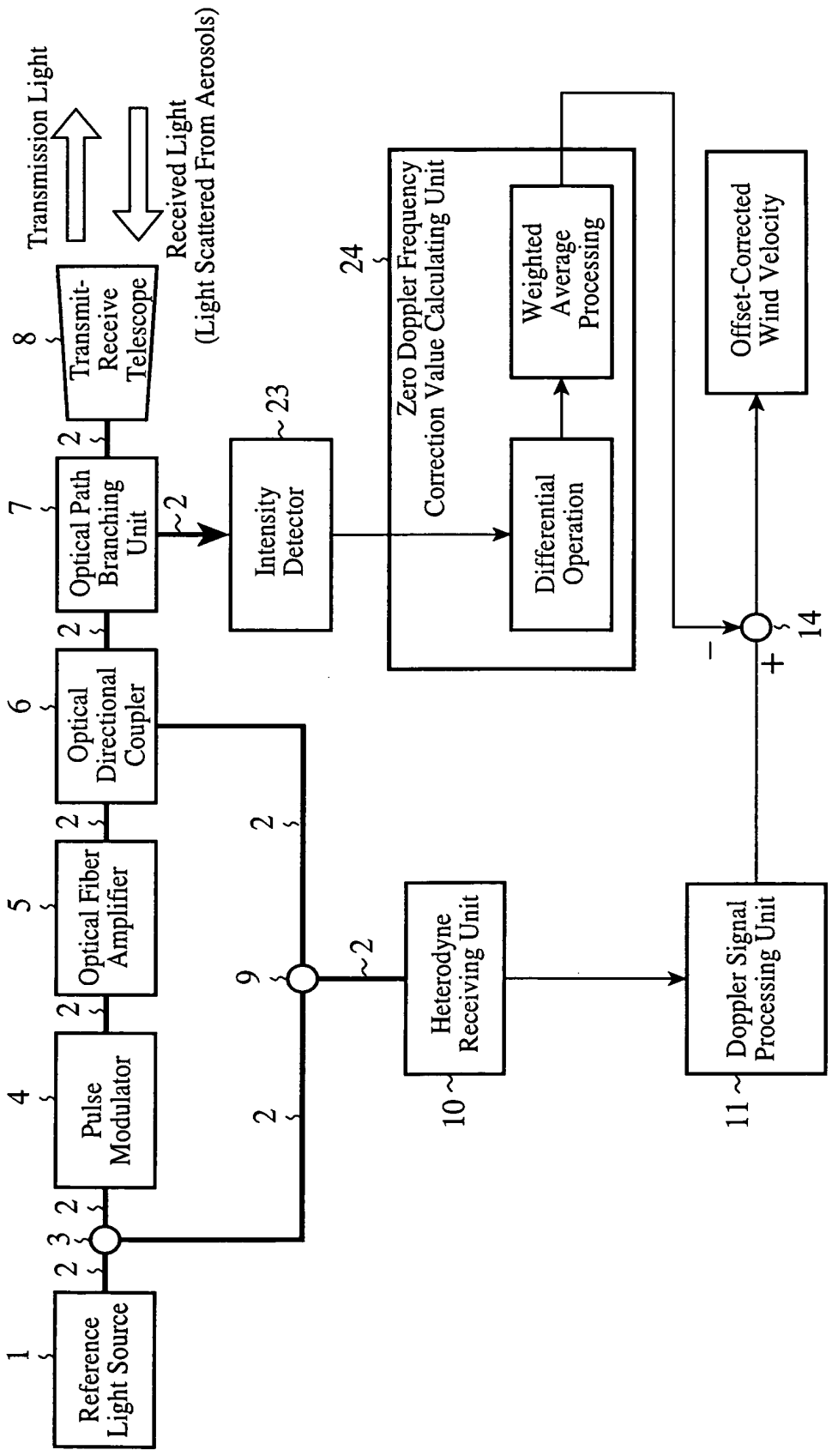

Reference Light Source
Pulse Modulator
Optical Fiber Amplifier
Optical Directional Coupler
Optical Path Branching Unit
Transmit-Receive Telescope
Transmission Light
Received Light
(Light Scattered From Aerosols)
Intensity Detector
Zero Doppler Frequency Correction Value Calculating Unit
Differential Operation
Weighted Average Processing
Heterodyne Receiving Unit
Doppler Signal Processing Unit
Offset-Corrected Wind Velocity
1
2
3
4
5
6
7
8
9
10
11
14
23
24
+
−

FIG.9

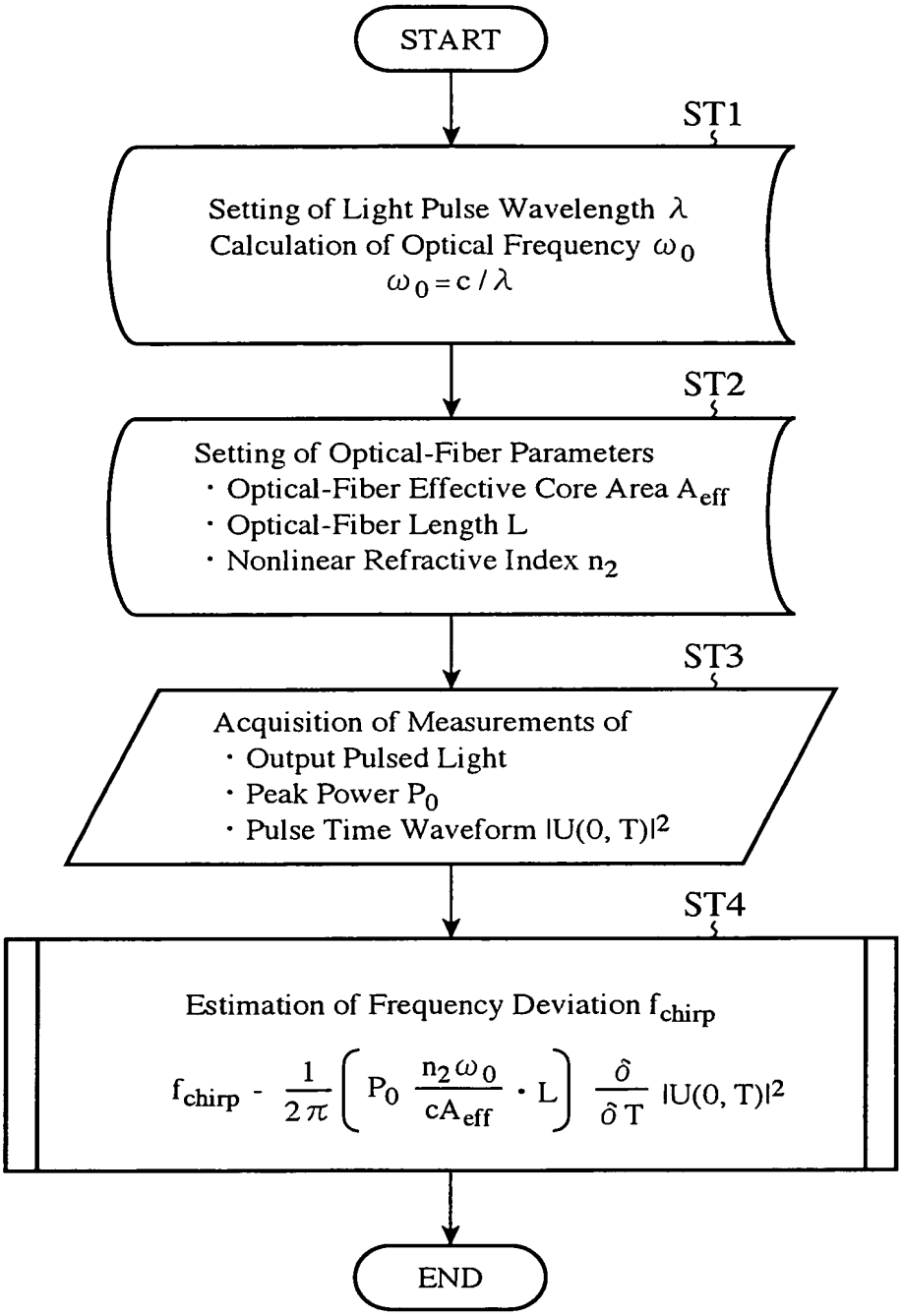

START
ST1
Setting of Light Pulse Wavelength λ
Calculation of Optical Frequency ω0
ω0 = c / λ
ST2
Setting of Optical-Fiber Parameters
· Optical-Fiber Effective Core Area Aeff
· Optical-Fiber Length L
· Nonlinear Refractive Index n2
ST3
Acquisition of Measurements of
· Output Pulsed Light
· Peak Power P0
· Pulse Time Waveform |U(0, T)|2
ST4
Estimation of Frequency Deviation fchirp
fchirp - 1/2π (P0 n2ω0/cAeff · L) δ/δT |U(0, T)|2
END

FIG.10

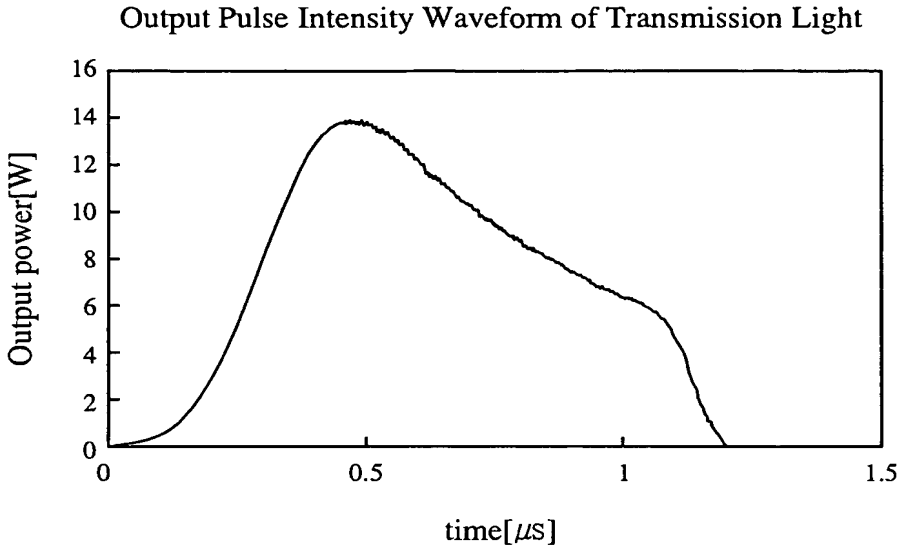
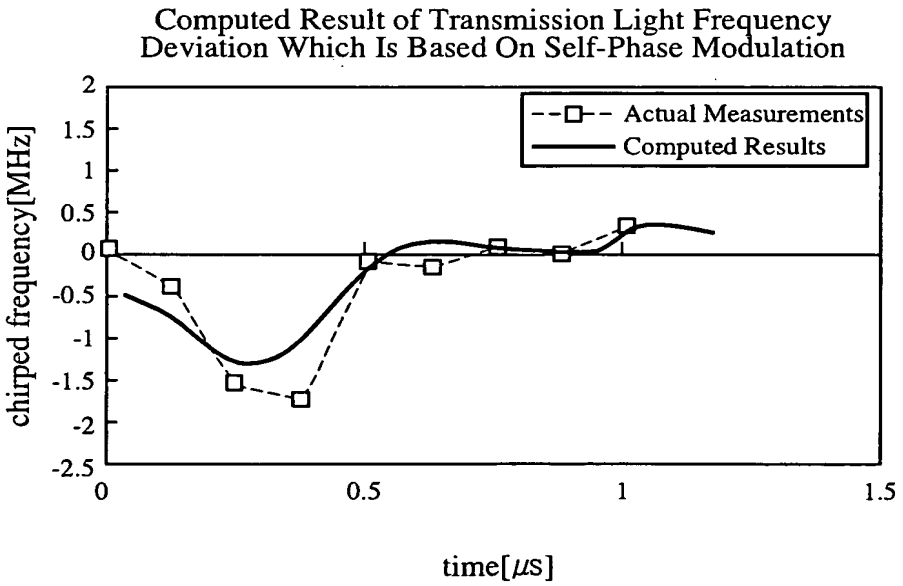

Output Pulse Intensity Waveform of Transmission Light
Output power[W]
16
14
12
10
8
6
4
2
0
0
0.5
1
1.5
time[μs]

FIG.11


Computed Result of Transmission Light Frequency Deviation Which Is Based On Self-Phase Modulation
chirped frequency[MHz]
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
0.5
1
1.5
time[μs]
Actual Measurements
Computed Results